

Application No.: 09/507,465

Docket No.: M4065.0018/P018-A

REMARKS

Reconsideration and allowance of this application, as amended, are respectfully requested. Claims 10 and 26 have been amended; claims 10, 12-16, and 26 remain pending in the application. Applicants' representative acknowledges with gratitude the courtesies extended during the personal interview of June 20, 2002.

Claims 10 and 26 have been amended to define the coolant that cools the chuck as being a "gaseous coolant." Support for the recitation of a gaseous coolant is found, for example, at Applicants' specification page 10, line 23, through page 11, line 4, where Applicants describe the use of a gaseous coolant (helium) in the method of the invention, and disclose that the "lift rod 102b conveys helium to the coolant chamber 100 and the slots 16a."

The method defined by claims 10 and 26 is patentable over the combination of U.S. Patent No. 5,460,684 to Saeki et al. (hereinafter "Saeki") and U.S. Patent No. 4,902,531 to Nakayama et al. ("Nakayama") applied in the Office Action of February 5, 2002. As articulated in Applicants' Request for Reconsideration filed May 6, 2002, Saeki is directed to a plasma etching apparatus. Saeki's apparatus is not rotatable. To cool the wafer during etching, Saeki employs a cooling block 21 "at the center of the bottom portion of the process chamber 1 via an insulator 16" (Saeki column 3, line 67, through column 4, line 1). Saeki describes the cooling block (see Fig. 1) as follows:

In the cooling block 21, a bore 22 is formed for the purpose of circulating a coolant such as liquid nitrogen. An introduction tube 22a and an exhaustion tube 22b are connected to the bore 22, and the cooling liquid is supplied into the bore 22 via

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the introduction tube 22a, and is exhausted to the outside of the process chamber 1 via the exhaustion tube 22b. (Column 4, lines 4-10)

Thus, Saeki employs a liquid coolant, and introduces the liquid coolant to the cooling block through an introduction tube 22a, and removes the liquid coolant through an exhaustion tube 22b.

Nakayama is directed to "a method of and an apparatus for processing substrates in [a] vacuum chamber" (column 1, lines 7-9). Nakayama's method of processing employs an apparatus that is rotatable. To cool the wafer during processing, Nakayama employs a "cooling water feeding device 45" (column 5, lines 52-53). Nakayama describes the cooling system (see Fig. 5) as follows:

The lower end portion of the rotating shaft 19 is passed through the opening 27a of the lower mounting plate 27 and is connected to a cooling water feeding device 45 which may be a rotary union and from which cooling water is fed through a feed channel of the rotating shaft 19 and flows out of the rotating shaft 19 through a return channel thereof. The electrode body 12 is provided with a separated cooling water supply which is not shown. (Column 5, lines 50-58)

Thus, Nakayama also employs a liquid coolant, and introduces the liquid coolant through a feed channel of the rotating shaft 19, and removes the liquid coolant through a return channel.

Applicants' claimed method is different from the method that would result from the combination of disclosures asserted in the Office Action of February 5, 2002.

Applicants' claimed method (claim 1) includes not only "coupling a chuck to a rotatable

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pedestal, the pedestal comprising a central bore having a hollow shaft disposed therein, the chuck and the pedestal cooperating to define a coolant chamber in fluid communication with the hollow shaft," but "plasma etching the rotating wafer while cooling the chuck by communicating a gaseous coolant through the hollow shaft to the coolant chamber."

Even if the references were combined as was asserted in the Office Action, the combined disclosures would not result in the claimed invention. Saeki discloses a non-rotating, liquid-cooled, plasma etching apparatus. Nakayama discloses a rotating, liquid-cooled, processing apparatus. Aside from employing a rotating susceptor, the disclosure of Nakayama adds nothing to remedy the deficiency associated with Saeki. At best, the combined disclosures would result in a rotating, liquid-cooled, processing apparatus, but certainly would not result in Applicants' claimed method of plasma etching that includes, *inter alia*, cooling the chuck with a gaseous coolant.

There is, therefore, neither a suggestion nor a motivation in the combined disclosures of Saeki and Nakayama to derive the plasma etching method defined by each of Applicants' independent claims 10 and 26. Dependent claims 12-16 are allowable along with independent claim 10, and on their own merits.

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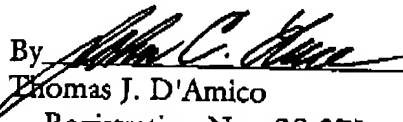
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Favorable action on the merits is respectfully requested.

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Respectfully submitted,

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Version With Markings to Show Changes Made

In the Claims:

Please amend the claims as follows:

10. (Three times amended) A method of plasma etching a wafer, said method comprising:

coupling a chuck to a rotatable pedestal, the pedestal comprising a central bore having a hollow shaft disposed therein, the chuck and the pedestal cooperating to define a coolant chamber in fluid communication with the hollow shaft;

coupling the wafer to the chuck;

rotating the pedestal so as to rotate the coupled wafer; and

plasma etching the rotating wafer while cooling the chuck by communicating a gaseous coolant through the hollow shaft to the coolant chamber.

26. (Amended) A method of plasma etching a wafer by means of a plasma etching machine comprising a process chamber, a rotatable, internally cooled chuck disposed in the process chamber, a clamp coupled to the chuck; a controller coupled to the process chamber and chuck for controlling gas flow and pressure in the process chamber and rotation of the chuck, a pedestal coupled to the chuck and cooperating therewith to define a coolant chamber, the pedestal including a coolant passage in fluid communication with a gaseous coolant source and the coolant chamber; and a lift actuator coupled to the

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coolant passage, the coolant passage moving in the pedestal in response to actuation of the lift mechanism to lift the wafer from the chuck, said method comprising the steps of:

coupling the chuck to the pedestal;

coupling the wafer to the coupled chuck;

rotating the pedestal so as to rotate the coupled chuck and the coupled wafer;

and

plasma etching the rotating wafer while cooling the chuck.